Food Information Series
United States Department of Agriculture
Office of Information
Washington 25, D. C.

September 4, 1943 No. 61

Subject: Background Statement on Flax

Field Distribution: War Board members, Extension Editors, SCS Regional Information Chiefs, FDA Regional Marketing Reports Chiefs, BAE Regional Analysts, FSA Regional Information Chiefs, FCA Information Agents.

Suggested Use: To be used as background material.

Two types of flax are raised in the United States, both vital to the war effort and both bringing excellent returns to the farmer. One is the short, much-branched type grown for oil seed, and the other is the tall, less branched type that produces fiber for spinning and weaving.

European countries concentrate on flax for fiber, while the United States, Argentina, and British India grow flax mainly for oilseed. Fiber flax varieties produce longer and more abundant fibers, while seed flax varieties produce the better seed yields. For this reason flax is grown for one purpose or the other. Also, early cutting essential for good fiber quality impairs the quality of the seed and reduces its quantity. However, straw from seed flax and seed from fiber flax are valuable by-products.

As early as 1791 the United States exported 292,640 bushels of flaxseed, and the manufacture of linseed oil in this country began in that year. From 1850 to 1860 half of the United States crop was grown in Ohio and Kentucky. By 1892 the nation had become an important exporter of flaxseed, but after 1914 both acreage and production fell off because new land was becoming scarce. Until recently, when resistant varieties became available, yields diminished rapidly as the old land became infested with the flax wilt organism.

Before the present war, an average of around 18 million bushels of flaxseed was imported annually, principally from the Argentine. Today we are less dependent on outside sources for linseed oil.

Flaxseed in its natural state has very limited domestic uses on the farm. Internal commerce involves the entire crop, although it returns to the farm as livestock feed in the form of linseed meal.

Flax raising for oil gave farmers in the United States a cash income of $96,000,000 in 1942. Indications are that the 1943 crop will set a new record for production and income.

Special emphasis on flax came with the war. Importations formerly exceeded domestic production. When curtailment of shipping facilities diminished supplies, it was up to America's farmers to meet increasing war demands.

Peak production before the war was in 1924, when about 31,200,000 bushels were produced with a farm value of some $68,000,000.

New Records Indicated

The 1942 record of 40,660,000 bushels will be exceeded by 34 percent when the 1943 crop is harvested, if expectations of 54,331,000 bushels from this year's acreage are fulfilled. The new record will be almost four times the 10-year (1932-41) average of 14,226,000 bushels.

Production is limited largely to five states --- Minnesota, North Dakota, South Dakota, California and Montana --- where over 85 percent of the 1943 acreage will be harvested. Indicated United States yield is 9.3 bushels per acre, one-tenth of a bushel higher than 1942's record crop and two bushels more than the ten-year average of 7.3 bushels. Above or near-average yields are indicated for most states. Average oil yield per bushel is 19 pounds, giving a potential yield of nearly 177 pounds of oil per acre in 1943.

Seeded acreage, at 6,289,000, is 4 percent higher than the intended acreage announced in March, and exceeds the 1943 goal of 5,500,000 acres as well as being 34 percent larger than the 1942 planting. Nearly all states show large percentage increases, except Illinois and Michigan where the acreage is smaller than last year.

Total acreage for harvest is 5,843,000, compared with 4,402,000 acres harvested in 1942. Although the probable loss of about 8 percent of the seeded acreage is two points higher than for the 1942 crop, it is much lower than the 20 percent average loss for the 10-year period of 1932 through 1941.

North Dakota is first in seedings this year, with 3,039,000 acres, an increase of 613,000 acres over 1942. Minnesota is second among the leading growing States with 1,841,000 acres, as compared with last year's 1,674,000. South Dakota growers upped their seedings by 283,000 over 1942 for a total of 665,000 acres. Other leading states in flaxseed production are Montana, with 615,000 acres; Kansas, 322,000 acres; Iowa, 307,000 acres, and California, 308,000 acres. The total increase for these four states is 463,000 acres.

Together with the large stocks of linseed oil and flaxseed in the United States at the beginning of the year, the indicated 1943 crop of flaxseed makes certain a total supply of linseed oil this year in excess of 1,000,000,000 pounds.

Production last year amounted to 960,000,000 pounds, 10 percent more than in 1941, previous peak year. Stocks of linseed oil were at a record high level of 198,000,000 pounds at the beginning of the year and increased to 297,000,000 pounds at the start of 1943.

Minnesota Leads

Anticipated yields in the seven leading growing states show Minnesota with a top production of 17,700,000 bushels, or 1,750,000 more than last season. North Dakota is second with 12,859,000 bushels, an increase of 3,675,000 bushels over last year, due mainly to a greater increase in acreage. South Dakota's increase of 2,832,000 bushels makes a total anticipated 1943 production of 6,352,000 bushels. Other estimated productions for this year include California, 5,015,000 bushels; Montana, 4,768,000 bushels; Iowa, 3,762,000 bushels, and Kansas, 2,051,000 bushels.

Export demand for linseed oil this year will be large, according to present estimates. Purchases by Food Distribution Administration in the first four months of the year amounted to 138,000,000 pounds, compared with a total of 75,000,000 pounds in the entire year of 1942. In addition, linseed oil will be used in shortening and margarine for export.

The available supply of linseed oil for the drying industries probably will be considerably smaller this year, but at the same time there will be a continuing decline in consumption of fats and oils in these industries due to existent curtailment of building activity.

Linseed oil accounted for 85 percent of the total quantity of fats and oils used in the drying industries in 1942, with the usual supply of oils from abroad continuing to be curtailed and linseed oil abundant. This is the highest percentage in 12 years of record.

Total amount of linseed oil used by these industries in 1942, exclusive of core oils, coated fabrics and artificial leather, was 779,000,000 pounds. While slightly less than the amount utilized in 1941, it marks a 10 percent greater consumption for drying purposes than in 1941 when 75 percent of all oil used was linseed. The average linseed oil consumption by the drying industries in 1931-40 was 70 percent of the total oil utilization, or 15 percent less than in 1942.

Cash farm income of $96,000,000 from flaxseed last year was nearly twice as much as in 1941, when the crop brought $52,000,000. This was a big increase over the 1940 return to farmers of $34,000,000.

The 1943 crop is expected to bring in excess of $145,000,000 to growers. Maximum price established on May 21 for flaxseed at Minneapolis is $3.05 per bushel, which is 4 cents above the market price calculated to be equivalent to the July 15 farm parity price of $2.79 per bushel. Flaxseed to be used for planting the 1944 crop or for food or medicinal purposes is exempted from price ceilings.

Ceiling price for linseed oil, as of May 21, is 14.5 cents per pound in tank cars delivered at Minneapolis.

Many War Uses

Linseed oil has many uses important to the successful carrying on of the war. Its primary job is as a quick-drying oil. Last year the paint and varnish industry used 654,899,000 pounds, a slight increase over 1941 and totalling 85 percent of all the oil used by the industry. Linoleum and oilcloth manufacture took 108,651,000 pounds, about a million and a half pounds less than was used in 1941 but accounting for 93 percent of the oil employed for this purpose. Eighty-eight percent of the oil used in making printing inks was linseed, a total of 15,322,000 pounds. With a decrease in the total quantity of oil used in manufacturing of these inks, the amount of linseed oil employed was over 8,000,000 pounds less than in 1941.

Flaxseed grown by American farmers and crushed into linseed oil is on every battle line of the war in the form of paints, varnishes and preservatives for battleships, planes, tanks, guns, cantonments and many other types of war

equipment and installations. A single acre of flaxseed, for example, will paint 10 medium bombers, 40 field guns of the 37 mm. class, 30 field guns of the 75 mm. class, 20 field guns of the 155 mm. class, and 25 howitzers of the 155 mm. class.

Linseed oil is one of the oils used to bind fine sands for foundry molds. Castings for both civilian and military machinery are produced from these molds.

By-products of the oil do a war job, too. Linseed press cake meal, left after crushing the seeds, is used primarily as a high-protein feed for livestock.

The flax straw from the seed crop was until recently mainly a waste product. The bast fiber from this straw, after being separated from the woody portion or "shive" by passing through a tow mill, is the raw material for the new American cigaret industry. Approximately 200,000 tons of seed flax straw are so used. A portion of the flax shive, which comprises about 80 percent of the straw, is used for fuel at the tow mill, but a large tonnage is still unused industrially. This year the Northern Regional Research Laboratory at Peoria, Illinois has shown that flax shives are suitable for manufacturing a thermosetting plastic. A small tonnage of flax shives is used, together with cornstalks, for making insulating building board. Thus far whole seed flax straw and flax shives have not been used for other types of paper or pulp, but the possibility of their use exists. Considerable quantities of flax straw are now employed commercially in the manufacture of upholstery tow, and there is a well-developed industry based on the manufacture of flax straw rugs.

Fiber Flax Program

In addition to increasing flax production for oilseed, the war has brought the growing of flax for fiber into active operation. The 1942 seeded acreage, grown almost exclusively in Oregon, was 19,000 acres, an increase of more than 50 percent over 1941. Owing to lack of processing facilities, only 14,700 acres were seeded this year.

Fiber flax is used in manufacturing sturdy parachute harness, bomb slings, rigging and signal halyards, packing for marine engines, and other heavy-duty materials for war uses. American-grown fiber flax is excellent for this purpose, although it has never been successful for weaving fine linen materials such as are made from European-grown flax. Sack twine, fishing lines and nets, shoe thread and heavy-duty sewing thread also employ fiber flax.

Cultivation and preparation of flax were among the first textile indutries, distinct traces coming down from the Stone Age. In ancient Egypt flax was very important, as linen was an extensively used clothing material and priests could wear no other. Mummies taken from Egyptian tombs are found wrapped in linen bindings, and from early times "fine linen" was a sign of wealth and position.

Among the western nations flax was without competition the most important of all vegetable fibers until toward the close of the 18th century when cotton came into prominence. It has greater antiquity than any other commercial fiber, and with proper care can be grown throughout the temperate world wherever

arable lands and sufficient rainfall, or irrigation water, are found.

The United States grew large quantities of fiber flax in pioneer days when it made the coarse homespuns that were the basic dress of the people. But cotton that could be spun on high-speed machines --- flax is too tough for that --- replaced it and now most linen used in this country is imported, either as finished cloth or a flax fiber. During the 10-year period 1926-35 an average of 8,500 tons of flax fiber per year was used in domestic industry, most of it shipped in.

Willamette Valley farmers in Oregon continued to grow flax occasionally despite the small market for their crop. In 1915 the Oregon legislature appropriated $50,000 to put in a processing mill at the Salem penitentiary, giving the inmates constructive work to do and establishing for the farmers a cash market for a commercial crop from about 2,000 acres of fiber flax.

Industry Saved

Although this helped out, additional subsidies and public assistance were necessary for continued fiber flax production. Other processing mills were constructed with public funds. Extensive research by the Department of Agriculture, in cooperation with the Oregon Agricultural Experiment Station, resulted in more economical harvesting and retting, and other processing methods. In 1936 the Agricultural Adjustment Agency announced benefit payments of $5.00 a ton for fiber flax. These aids came at the psychological moment to keep the domestic fiber flax industry from disappearing.

How important this was to future needs became apparent with America's entry into the present war five years later. Almost overnight flax fiber assumed the role of a vital war crop, necessary for service demanding a strong, flexible fiber. In Oregon's Willamette Valley, where the farmers had refused for half a century to give up this crop, was centered 99 percent of the nation's fiber flax production.

Twenty-four thousand tons of straw to be processed for fiber were harvested from 11,000 acres in 1941. This produced about 2,000 tons of fiber. Last year 18,000 acres were harvested, with a crop of about 36,000 tons of straw. Production in 1943 is estimated at about 24,000 tons from 14,000 harvested acres. The Valley could easily grow at least 75,000 acres of flax, enough for some 10,000 tons of processed fiber a year --- sufficient for all the war uses for which this flax fiber is suitable.

Importations of fiber flax are still coming from Peru, Chile and Canada to supplement domestic production, due to lack of enough processing plants. Three new plants were built in Oregon in 1941 and 1942 through the cooperation of the Commodity Credit Corporation, and two more are being constructed in 1943. Flax growers sell their crops to these plants on a cooperative basis, as well as to the penitentiary plant still in operation, sharing in the returns from the processed fiber.